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INTRODUCTION

India is a developing nation with a sizable population, the most of whom continue to live in poverty. Human capital and fertility are two crucial elements that influence a nation's progress. To maintain sustainable economic growth and development, India must strike a balance between fertility and human capital.

There is a significant relationship between fertility and human capital, as fertility can impact an individual's ability to invest in their education and career, and in turn, their overall human capital.

According to the human capital theory advocated by **Becker (1964) and Schultz (1961)**, Human capital refers to the knowledge, skills, and abilities that an individual possesses and that can be used to produce economic value. Investment in human capital, such as through education and training, can increase an individual's productivity and earnings potential. According to the Human Capital Index 2020 released by the World Bank, India's score improved from 0.44 in 2010 to 0.49 in 2020.

Fertility, on the other hand, refers to the ability to bear and raise children. Having children can be a significant investment in terms of time, energy, and resources, and can impact an individual's ability to pursue education and career opportunities. For example, women who have children may be more likely to take time off from work or reduce their hours in order to care for their children, which can impact their career advancement and overall human capital. According to the World Bank, India's fertility rate was 2.6 births per woman in 2010 and 2.3 births per woman in 2020. This indicates a decline in fertility rates over the decade, although the fertility rate in India still remains higher than the global average. We find that in India between 2010 and 2020 a decline in fertility rate coincides with an increase in human capital.

Improvements in education and employment opportunities, particularly for women, are associated with lower fertility rates as women tend to have fewer children when they have access to education and better job prospects. Additionally, as fertility rates decline, there may be more resources available for investments in education and human capital, which can further drive improvements in this area.

Additionally, the cost of raising children, such as for child care, education, and other expenses, can also impact an individual's ability to invest in themselves as human capital. As such, fertility and human capital can be interconnected, with one potentially impacting the other.

LINK BETWEEN HUMAN CAPITAL AND ECONOMIC GROWTH.

Economic expansion and human capital are related. Human capital refers to the knowledge, skills, and abilities of an individual, which can be used to produce economic value. As such, investing in human capital, such as through education and training, can increase an individual's productivity and earnings potential, which can in turn contribute to economic growth.

Higher levels of human capital can cause an increase in innovation and technological advancement, which can drive economic growth by increasing productivity and efficiency. For example, a highly educated workforce may be better equipped to adapt to new technologies and processes, leading to increased output and economic growth.

Investment in human capital can also lead to a more skilled and specialized labor force, which can attract businesses and investment to an area, further contributing to economic growth.

In addition to individual human capital, the overall level of human capital in a society can impact economic growth. For example, countries with higher levels of education and training tend to have higher levels of economic growth. As such, policies and investments that promote

education and training can contribute to overall human capital development and economic growth.

LINK BETWEEN HUMAN CAPITAL AND STANDARD OF LIVING.

There is a strong relationship between human capital and the standard of living of a family. Human capital refers to the knowledge, skills, and abilities that an individual possesses and that can be used to produce economic value. Investment in human capital, such as through education and training, can increase an individual's productivity and earnings potential, which can in turn improve their standard of living.

A higher level of human capital can lead to better job opportunities and higher wages, which can increase a family's income and ability to afford a higher standard of living. For example, a family with higher levels of human capital may be able to afford a larger or nicer home, better quality healthcare, or higher quality education for their children.

In addition to increasing income, higher levels of human capital can also lead to increased job security, which can provide a sense of financial stability and contribute to a higher standard of living.

Overall, the link between human capital and standard of living highlights the importance of investing in education and training, as it can have positive impacts on an individual's ability to earn a higher income and improve their standard of living.

INDIA'S FERTILITY RATE

Year	Fertility Rate
1951	6
1961	5.9
1971	5.9
1981	4.5
1991	3.4
2001	2.8
2011	2.4

Source: Census of India: https://censusindia.gov.in/

The fertility rate is the average number of children that a woman will have in her lifetime. In 1951, the fertility rate was 6.0, meaning that the average woman had six children in her lifetime.

As we can see from the table, India's fertility rate has been steadily declining since the 1950s. This decline can be attributed to a variety of factors, including increased access to education and family planning services, urbanization, and changing social and cultural norms. It is worth noting that there are significant regional variations in fertility rates within India, with some states having fertility rates that are much higher or lower than the national average.

As per Indian Economic Survey 2021-22, Total Fertility Rate in Maharashtra declined from 2.9 in 1992-93 to 1.7 in 2019-21. There has been a 42.16% decrease in the total fertility rate of Maharashtra from 1992 to 2021.

EFFECTS OF DECLINE IN FERTILITY RATE ON THE ECONOMY.

POSITIVE EFFECTS

There are several potential positive effects of lower fertility on the economy. One is that it can lead to a more educated and skilled workforce. When families have fewer children, they may be able to invest more resources in the education and development of each child. This can lead to a more highly skilled and educated workforce, which can be beneficial for economic growth and competitiveness.

Another potential positive effect is that it can lead to a more sustainable population size. With lower fertility rates, the rate of population growth may slow or even stabilize, which can be beneficial for the environment and natural resources. This can also help to alleviate pressure on public services and infrastructure, such as schools and healthcare systems.

Decline in fertility rate would lead to positive effects on the economies which have large population sizes such as India.

NEGATIVE EFFECTS

Lower fertility rates can have a number of economic consequences. One potential impact is a declining labour force, which can lead to a shortage of workers and potentially slower economic growth. With fewer people entering the workforce, there may be less demand for goods and services, which could lead to slower economic growth.

Another potential impact is an aging population. As fertility rates decline and people live longer, the proportion of the population that is of working age may decline, while the proportion of the population that is elderly may increase. This can put pressure on the social

security system and healthcare system, as there may be fewer workers to support the needs of a growing elderly population.

Decline in fertility rate would lead to negative effects on the economies which have small population sizes such as Australia.

However, it is important to note that the relationship between fertility rates and economic outcomes is complex, and there are many other factors that can influence economic growth and development.

THERE ARE SEVERAL MICROLEVEL VARIABLES THAT CAN AFFECT FERTILITY, INCLUDING:

1. **Age at marriage:** The age at which an individual gets married can impact fertility. For example, individuals who marry at an older age may have lower fertility due to age-related fertility declines. A study by **Acharya (2010)** on female age at marriage, fertility rate and child loss confirm that there is an inverse relationship between female age at marriage and fertility rate.

2. **Education level:** Education develops understanding, responsibility and accountability among parents. Education level can affect fertility, as individuals with higher levels of education may be more likely to delay marriage and childbearing. **Kim (2016)** has found that an increase in female education causes a decline in the fertility rates.

3. **Economic status:** Economic status can also impact fertility, as financial stability may be a factor in an individual's decision to have children. **Vogl (2013)** in his study has found that there is a direct relationship between income of a household and fertility rate.

4. **Employment of female partner:** Employment can require a significant amount of time and energy, which can impact an individual's ability to bear and raise children. For example, women who work long hours or have demanding careers may have less time and energy to devote to childrearing.

5. **Child mortality:** Child mortality, or the death of children before the age of five, can have an impact on fertility. When child mortality rates are high, parents may have more children in order to increase the likelihood that at least some of their children will survive to adulthood. This can lead to higher fertility rates and larger families. According to the demographic transition theory, decline in child mortality is followed by decline in the fertility rates. **Raivio K (1990)** in his study has found out a direct relationship between child mortality and fertility rates.

IMPORTANCE OF THE THEME AND SIGNIFICANCE OF THE STUDY

Policymakers and scholars must comprehend the elements that affect fertility rates. The fertility rate is a crucial demographic statistic that has a big impact on social and economic progress. The study can provide valuable light on the variables that influence fertility behaviour by evaluating the relationships between female age at marriage, education level, family income, job status of female spouse, and child death rate. These revelations can help shape the creation of efficient policies that support reproductive health, gender equality, and economic growth.

The study fills a sizable gap in the body of knowledge. Although there is a lot of research on fertility rate and related components, relatively little of it looks at how these socio-economic factors affect fertility rate. The study has the potential to significantly advance the discipline and offer insightful information for ongoing work by addressing this gap.

The study is crucial since it may have a noticeable effect on people's lives. Policymakers and academics can create effective policies and programmes that can enhance reproductive health outcomes, advance gender equality, and boost economic growth by studying the factors that affect fertility rate. In the communities and nations under study, this may have a favourable effect on the wellbeing and quality of life of citizens, particularly women and children.

The study is especially important in the context of high-population countries like India, where lower fertility rates could lead to the creation of human capital, which is essential for long-term economic growth.

In countries with high fertility rates, a larger proportion of the population is made up of children and young adults. This can put a strain on resources such as education, healthcare, and employment opportunities, and limit the country's ability to develop its human capital. Lower fertility rates, on the other hand, can lead to a more favourable age structure, with a higher proportion of the population in the working-age group. This can provide an opportunity to

invest in education, healthcare, and other human capital development programs, leading to long-term economic growth.

India has made significant progress in reducing its fertility rate over the past few decades, but the country still has a relatively high fertility rate compared to other developing countries. The study can provide important insights into the factors that influence fertility behaviour in India, such as the age at marriage, education level, household income, employment status of the female partner, and child mortality rate. By identifying the factors that contribute to high fertility rates in India, the study can inform the development of effective policies and programs aimed at promoting reproductive health and improving access to education and employment opportunities, leading to the creation of human capital and long-term economic growth.

OBJECTIVES OF THE STUDY

1) The study aims to investigate the relationship between various micro-level variables and fertility rate.
2) The study recognizes that both very high and very low fertility rates can be detrimental to the economy.
3) The study aims to help policy-makers by providing insight into how micro-level variables affect fertility rates.
4) The study aims to enable the government to create incentives to manage the fertility rate in the region.
5) The study aims to promote sustainable levels of population growth.
6) The micro-level variables that the study will examine are the age of the female partner at marriage, the female education level, the economic status of the household, the employment of the female partner, and the experience of child mortality.

RESEARCH PROBLEM AND HYPOTHESIS

The research problem which this study aims to tackle is finding out the relationship between micro-level variables on fertility rate and human capital formation.

Following are the hypothesis which this study aims to test,

H0: There is no relationship between female age at marriage and fertility rate.
H1: There is a relationship between female age at marriage and fertility rate.

H0: There is no relationship between female education level and fertility rate.
H1: There is a relationship between female education level and fertility rate.

H0: There is no relationship between household income and fertility rate.
H1: There is a relationship between household income and fertility rate.

H0: There is no relationship between employment status of female partner & fertility rate.
H1: There is a relationship between employment status of female partner & fertility rate.

H0: There is no relationship between child mortality rate and fertility rate.
H1: There is a relationship between child mortality rate and fertility rate.

RESEARCH METHODOLOGY

To study the relationship between micro-level variables and fertility rate, we will consider using statistical analysis techniques such as regression analysis. Regression analysis is a statistical method that can be used to examine the relationship between one or more independent variables (such as education, income) and a dependent variable (such as fertility rate).

To conduct a regression analysis, we will need to collect data on the variables of interest for a sample of individuals or households. We can then use statistical software to fit a statistical model to the data that estimates the relationship between the independent variables and the dependent variable. This will allow us to quantify the strength and direction of the relationship between the variables, and to test hypotheses about whether certain variables are associated with fertility rate.

In the study, the aim is to use both primary and secondary data. Using both primary and secondary data in the study will be beneficial because it can provide a more complete and nuanced understanding of the relationship between micro-level variables and fertility rate.

Primary data is data that the researcher will collect through methods such as surveys, interviews, or experiments. Primary data is useful because it allows the researcher to collect data that is specifically tailored to the research questions and can provide up-to-date and accurate information.

Secondary data, on the other hand, is data that has been collected by someone else for a different purpose. Examples of secondary data sources include government statistics, academic studies, and data from non-profit organizations. Using secondary data can be a useful way to save time and resources, as the data has already been collected and may be freely available. However, it is important to carefully evaluate the quality and relevance of the secondary data

you are using, and to consider how it might be affected by biases or limitations in the original data collection process.

By combining both primary and secondary data in the study, we can potentially overcome some of the limitations of each type of data and get a more comprehensive understanding of the relationship between micro-level variables and fertility rate.

QUANTITATIVE FRAMEWORK FOR ANALYSIS OF PRIMARY AND SECONDARY DATA

1. Data Collection

- **Primary Data**

For this study, surveys will be designed to capture information on female age at marriage, educational attainment, family income, job status of the female spouse, and child death rate. The primary data collected will provide a firsthand account of individual experiences, attitudes, and behaviours related to fertility.

- **Secondary Data**

Relevant datasets on fertility rates, demographic trends, and socio-economic indicators will be accessed These secondary data sources provide a broader context for the study and allow for comparisons and trend analyses over time. The National Family Health Survey (NFHS) is a particularly noteworthy secondary data source, providing comprehensive and nationally representative data on various health and demographic indicators. NFHS datasets include information on fertility, maternal and child health, family planning, and more, making it a valuable resource for gaining insights into the broader context of this study.

2. Variable Measurement

- **Female Age at Marriage**

Measurement for the variable will be in years, and a categorical breakdown may be useful (e.g., early marriage, mid-twenties, late marriage).

- **Education Level**

The study will quantify the educational attainment of females, considering variables such as years of schooling, highest degree obtained, or educational categories (e.g., primary, secondary, tertiary).

- **Family Income**

Family income will be measured as a continuous variable. Categorization may be necessary for analysis (e.g., low income, middle income, high income).

- **Job Status of Female Spouse**

Capture the employment status of the female spouse, distinguishing between employed, unemployed, and part-time employment.

- **Child Death Rate**

Measure child death rate per 1,000 live births, providing insights into the impact of mortality on fertility decisions.

3. Data Analysis

- **Descriptive Statistics**

Descriptive statistics will be used to present a clear overview of the data. This includes calculation of means, medians, standard deviations, and frequency distributions for each variable.

- **Correlation Analysis**

Correlation analyses will be conducted to explore relationships between variables. Correlation analysis will enable us to understand the nature of relationship between the chosen micro-level variables and fertility rate of the household.

- **Regression Analysis**

Regression analyses will be performed to model the impact of each variable on fertility rates. Multiple regression models can be used to help assess the combined effect of several factors.

SAMPLE SIZE, SAMPLE SELECTION, AND SAMPLE DESIGN

1. Sample Size Determination

- **Power Analysis**

The determination of an appropriate sample size is critical for the statistical power of the study. Given the multifaceted nature of the research, involving variables such as female age at marriage, education level, family income, job status of the female spouse, and child death rate, a power analysis will be conducted. Software and tools such as G*Power will be used to conduct power analysis.

- **Practical Considerations**

Practical considerations, such as available resources, time constraints, and the feasibility of data collection, will also play a role in determining the sample size. Balancing the need for a representative sample with logistical constraints is essential to ensure the study's successful implementation.

- **Formula**

A commonly used formula for calculating the sample size in a simple random survey is:

$n = [z^2 * p * (1 - p)] / E^2$

Where:

a) n is the required sample size
b) Z is the Z-score corresponding to the desired confidence level (for 99%, $Z \approx 2.576$)
c) p is the estimated proportion of the population with a particular characteristic (0.5 is often used for maximum variability, providing the maximum required sample size)
d) E is the margin of error (expressed as a proportion)

With 95% confidence level ($Z = 1.96$) and a margin of error of 5% ($E = 0.05$), and no prior knowledge of the proportion. The calculation would be:

$n = [z^2 * p * (1 - p)] / E^2$

$n = [1.96^2 * 0.5 * (1 - 0.5)] / 0.05^2$

$n = [1.96^2 * 0.5 * 0.5] / 0.0025$

$n = 0.9604 / 0.0025$

$n = 384.16$

So, based on the above calculation, a sample size of approximately 385 families would be needed for a simple random survey in Thane District to achieve a 95% confidence level with a 5% margin of error.

2. Sample Selection

- **Random Sampling**

To enhance the study's external validity and minimize selection bias, a random sampling technique can be employed. This involves randomly selecting participants from the eligible population within the district. This approach ensures that each eligible individual has an equal chance of being included in the study, contributing to the generalizability of the findings.

3. Sample Design

- **Stratified Sampling**

To streamline data collection logistics and enhance efficiency, Stratified sampling is employed. This method involves dividing the population (district) into subgroups or strata (cities in this case) based on certain characteristics. Random samples are then taken from each stratum. This approach is useful when there are significant variations within the population, and you want to ensure representation from each subgroup.

NATIONAL FAMILY HEALTH SURVEY [NFHS]

The NFHS survey, a comprehensive and recurrent study spanning multiple rounds since its inception in 1992-93, emerges as a pivotal source of secondary data in my research. Covering a representative sample of households across India, it furnishes crucial insights into fertility, mortality, family planning, maternal and child health, reproductive health, nutrition, anaemia, and the quality of health services. Designated by the Ministry of Health and Family Welfare,

the International Institute for Population Sciences in Mumbai plays a central role in coordinating and guiding this invaluable survey, making it an essential resource for informing policies and addressing emerging health and family welfare concerns.

The inclusion of variables relevant to my research within the NFHS survey not only emphasizes its significance but also facilitates a meaningful comparison between insights derived from primary data analysis and secondary data analysis. This alignment ensures a comprehensive understanding, allowing me to draw insightful correlations and enrich the overall research findings.

SCOPE AND LIMITATIONS

There are various factors that affect the fertility rate in the economy but due to research constraints, the scope of the study is limited to certain variables that have been identified.

For primary data, the scope of the study is limited to Thane District, Maharashtra.

The data in consideration for this research is from the year 1951 to the year 2021.

REVIEW OF LITERATURE

Becker et al. (1990) in their study on family sizes and human capital formation find that there are two steady states that the economy experiences. One steady state has large families and little human capital, and the other steady state has small families and large and perhaps growing human and physical capital. This means there is a relationship between fertility rate and human capital formation.

Azarnert (2008) in his study on free education, fertility and human capital accumulation finds out that in the advanced stages of the economy's development when the human capital among the parents is high, the availability of free public education causes the crowding out private educational investments and increases fertility rate in the economy.

Bloom et al. (2009) in their study on "The Cost of Low Fertility in Europe" have found that a very high fertility levels have a negative effect on output per capita through low working-age shares. A decrease in fertility can have positive effects, but only up until the point where the proportion of the population in the working age group is at its highest. A fertility decline below this point can lead to a decrease in the working-age population and potentially lower per capita output. In underdeveloped areas with high fertility, reducing fertility will lead to an increase in per capita income. However, in more developed areas with low fertility, the effects of a fertility decline are more nuanced: there may be a short-term increase in per capita income, but it could decrease in the long run.

According to the study done by **Freedman et al. (1982)** on income and fertility, there is little evidence to suggest that there is a positive relationship between income and fertility when considering the simple overall relationship and examining the zero-order correlation.

In their study on "Do financial incentives affect fertility?" **Cohen et al. (2007)** have found that in developing countries, an increase in income from an economic growth may not lead to

significant decreases in birth-rates in the short term, and if it is desired to achieve a reduction in birth-rates, policies that increase the cost of having an additional child may be necessary.

Kebede et al. (2021) in their study on the relative importance of women's education on fertility desires have found that higher levels of education among women tend to lead to lower fertility desires. Education has a stronger effect on fertility intentions than wealth, and this is seen at both the individual and community levels. It is positive sign that education has a larger impact on fertility intentions than wealth because education can be directly influenced through public investment, while accumulating wealth is influenced by many factors that are difficult for policies to impact.

Broeck & Maertens (2015) find that the more women who are employed, the fewer children they tend to have. For many of the women studied, they had already made decisions about having children when they were given the opportunity to work. If women in this region continue to be employed or even have more job opportunities, it is likely that fertility rates will decrease even more, especially if women are able to work for longer periods of time and if younger women are able to work before deciding to have children.

Pebley et al. (1979) in their study on fertility desires and child mortality experience find that the link between the mortality rate of children and the desire for fertility is a common occurrence. In the short term, reducing child mortality may lead to an increase in population growth, but as people gain more experience with lower mortality rates, their fertility desires may shift and there is a decline in the fertility rate thus indicating a positive relationship between mortality rate and fertility rate in the long run.

In their study on relationship between public expenditure on education and fertility rate, **Lehr & Palivos (2001)** find that contrary to popular belief, increasing the amount of resources dedicated to public education does not consistently decrease fertility rates. This is because

education can have numerous impacts on the development of norms, beliefs, and overall health and well-being. In less developed economies, increasing the share of resources devoted to public education may actually lead to an increase in fertility, while in more developed economies, it tends to have the opposite effect and decrease fertility.

Acharya (2010) in his study on influence of female age at marriage on fertility and child loss finds that younger people have more children and experience a higher rate of child loss. Specifically, his study found that women who got married at a younger age had more children thereby resulting in an increase in the fertility rate. Thus, there is a negative relationship between female age at marriage and fertility rate.

A study on Female education and its impact on fertility conducted by **Kim (2016)** results in the findings that female education has an impact on fertility because it leads to higher incomes and better parenting skills, and it also improves the health of mothers and children. This can decrease the number of children a woman has and reduce the need for a large family. Thus, there is a strong correlation between female schooling and fertility.

TENTATIVE SCHEME OF THE CHAPERS

The tentative chapter plan in the thesis is as under:

1. Introduction: - This chapter will include the statement of the problem, significance of the study, background of the study, need, objective of the study, and layout of the thesis.

2. Review of Literature: - This chapter will include deep literature review on determinants of fertility, determinants of human capital, relationship between fertility and human capital.

3. Research Methodology: - This chapter will include work plane and methodology, conceptual framework, hypothesis, scope and sampling of data, and limitations of the study.

4. Determinants of fertility: - This chapter will include theories of fertility behavior, Fertility and mortality trend in Thane district, Maharashtra, determinants of fertility, Regression model, conclusion.

5. Understanding of human capital: - This chapter will include theories of human capital, concept, components of human capital, and conclusion.

6. Relationship between fertility and human capital: - This chapter will include introduction, and study of relationship between fertility and human capital.

7. Analysis of the data: - This chapter will include analysis of the data by using statistical tools.

8. Result, Summary, and Conclusion: - This Chapter will include the complete details of the findings, and conclusions.

9. References

BIBLIOGRAPHY

1. Acharya, D. R. "Influence of female age at marriage on fertility and child loss." Journal of Biosocial Science, vol. 42, no. 5, 2010. Acharya, D. R. "Influence of female age at marriage on fertility and child loss." Journal of Biosocial Science, vol. 42, no. 5, 2010.
2. Azarnert, L. V. "Free education, fertility, and human capital accumulation." Journal of Population Economics, vol. 21, no. 3, 2008.
3. Becker, G., C. Murphy, and R. Tamura. "Human Capital, Fertility, and Economic Growth." Journal of Political Economy, vol. 98, no. 5, 1990.
4. Bloom, D. E., D. Canning, and G. Fink. "The Cost of Low Fertility in Europe." National Bureau of Economic Research, 2009.
5. Broeck, G. V. D., and L. Maertens. "Female labour force participation and fertility in Eastern Africa." International Journal of Social Economics, vol. 42, no. 11, 2015.
6. Cohen, J. E., D. Lam, and Y. M. Moene. "Do financial incentives affect fertility?" Population and Development Review, vol. 33, no. 2, 2007.
7. Freedman, R., A. Thornton, and D. Camburn. "Income and fertility: A reassessment." The American Economic Review, vol. 72, no. 2, 1982.
8. Kebede, E., D. F. Roy, and M. C. Woldemariam. "The relative importance of women's education on fertility desires in Ethiopia." PLOS ONE, vol. 16, no. 3, 2021.
9. Kim, S. "Female education and its impact on fertility." Korean Journal of Population Studies, vol. 39, no. 3, 2016.
10. Lehr, C., and G. Palivos. "Public expenditure on education and fertility rate." Journal of Population Economics, vol. 14, no. 1, 2001.
11. Pebley, A. R., M. R. Nam, and M. S. Sogi. "Fertility desires and child mortality experience: Longitudinal evidence from South Korea." Demography, vol. 16, no. 2, 1979.

12. Kim, S. "Female education and its impact on fertility." Korean Journal of Population Studies, vol. 39, no. 3, 2016.